

BIOLOGY

Worker Bees

MINIATURE radio frequency, or RF, tags have been used to identify everything from compact discs to toll-booth vehicle passes. Now they're also being used to track the comings and goings of domesticated honeybees, in the hope that bees will lead researchers to buried land mines.

Entomologists at the University of Montana are gluing the tiny tags, about half the size and weight of rice

grains, to bees' backs. Each tag contains a 10-character code that identifies an individual bee. When the bee enters or exits the hive, it passes through an electronic tag reader that records its passage.

"Bees are flying dust mops," says Ron Gilbert of Pacific Northwest National Laboratory, where research scientists developed the bee tags and hive-mounted reader with funding from the Defense Advanced Research Projects Agency. If there are land mines in the area where bees are foraging, the bees' bodies pick up trace amounts of TNT released by the mines. The TNT can then be "sniffed" by a mass spectrometer, activated whenever a tagged bee passes through the reader. If TNT is detected, that means the area surrounding the hive should be searched carefully for mines.

Similar RF tags may someday be used to identify military gear such as M-16 rifles and night vision goggles. Currently, soldiers must conduct frequent inventories of this equipment to make sure nothing has been stolen. Radio frequency tags could make it easier to keep track of the expensive gear, or even disable it if it leaves a building without authorization.—D.S.



HEALTH

Farms or Pharmacies?

A GROWING number of doctors and scientists are warning that antibiotics are losing their effectiveness against diseases ["Superbugs," May]. Surprisingly, though, the U.S. Congress has refused to address one major cause of the phenomenon: the use of antibiotics in animal feed.

Every year, American farmers "prescribe" 50 million pounds of antibiotics, dumping them into livestock feeds, water supplies, fish ponds, and orchard sprays. At least 60 percent of all U.S. cattle, sheep, swine, and poultry are treated with antibiotics to promote growth and help prevent the spread of disease.

Veterinary antibiotics are given continuously, whether animals are sick or not, so it is not surprising that bacteria eventually develop resistance. The fear is that these antibiotic-resistant bacteria will be transmitted to humans in food, and that is exactly what scientists have discovered in a few recent cases.

Many of the antibiotics approved for animal use are also used to treat people. The latest research indicates that an antibiotic often becomes less effective in hospitals shortly after local farmers adopt it.

This past June, the Europeans banned all antibiotics in animal feed. But here in the United States, explains Patricia Lieberman, who is staff scientist at the Center for Science in the Public Interest, "a lot of people don't think about where their food comes from or how it is produced."—Mark D. Uehling



A radio frequency tag glued to this honeybee's back transmits the bee's identification code.

MEDICINE

Pointing the Way

STAN CLARK has Parkinson's disease. One of his most distressing symptoms is that his brain often stops communicating with his legs, and suddenly he cannot move. But Clark has noticed that gazing at patterns on the floor sometimes helps him start moving again—an observation that might benefit thousands of other patients.

While doctors have known that visual cues can help Parkinson's patients break a "freeze," nobody had come up with a practical way for patients to take advantage of this phe-

nomenon. Clark first tried etching a line into the lenses of his glasses. The line helped but blocked his vision. After more trial and error, Clark settled on a laser pointer that helps him keep moving. The device has also helped two other patients on whom Clark's doctors have tested it.

The doctors, from the University of Rochester's Strong Memorial Hospital, are urging their colleagues to keep a laser pointer handy for their Parkinson's patients to try. It's not often that a debilitating symptom affecting as many as 150,000 patients might be alleviated with a cheap, readily available fix.—Gunjan Sinha

NEWSFRONTS

SCIENCE

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TRANSPORTATION

Heavy Lifting

THIS SUMMER, a vast hangar, 1,100 feet long and 325 feet high, will rise from a former Soviet Air Force base near Berlin. It is the home for a giant airship with three times the volume of the largest airships of the 1930s.

Designed by the German company CargoLifter AG, the CL160 will measure 850 feet from nose to tail and 210 feet across. Holding 19.4 million cubic feet of helium, it will lift a 160-ton payload.

Four marine diesel engines, driving 20-foot propellers, will give the airship a range of 6,000 miles at a cruising speed

of 50 to 60 mph. The CL160 design will be tested this summer by a small prototype nicknamed Joey.

Many optimists have tried to revive the airship industry, with a record unblemished by success. The CargoLifter may have a better chance, because it is designed to do transport jobs that are not done efficiently by any existing system, and because it is industrial

The CargoLifter will transport heavyweight machines using a loading frame tethered by four cables, a design that keeps the load stable in wind gusts.

customers—rather than airship enthusiasts—who are backing the CargoLifter.

The CargoLifter's role is to move pieces of industrial machinery that weigh 100 tons or more, such as power-generating equipment or printing presses. Today, most such loads move on trailers or ships, which are slow and expensive and have difficulty reaching their destinations if the roads or ports are poor.

To deliver its cargo, carried by a loading frame, the hovering airship lowers the frame to within a few feet of the ground. Hoses attached to the frame are then

connected to a water supply. As the cargo is lowered, water ballast is pumped up into the loading frame so that the

ship always carries a constant load.

Several German companies that manufacture oversize machines are supporting the airship project. A full-scale CargoLifter is scheduled to fly in 2001, and commercial operations should start in 2004. The company believes there may be a worldwide market for at least 60 such ships, costing about \$60 million each.—Bill Sweetman

FORENSICS

What's in a Fingerprint?

AFTER THE TRAGIC kidnapping and murder of one child, and the abduction of another, Knoxville, Tennessee, detective Art Bohanan was certain he'd find fingerprints linking the children to suspects. But he was unable to find the victims' prints.

In search of an explanation, Bohanan conducted a series of experiments, having adults and children handle soda bottles and other objects. He discovered that children's fingerprints vanished more quickly.

Taking his research a step further, Bohanan recruited chemists at Oak Ridge National Laboratory to analyze the makeup of fingerprints. "Even a nonscientist could determine the difference between adults' and children's prints," says ORNL chemist Michelle Buchanan.

According to Buchanan, the chemical compounds in a child's fingerprints have lower molecular weight and higher volatility. That's because adult fingerprints contain fatty acids and oily materials from the face and hair, which are not present before puberty.

Fingerprints may provide clues about a person's health as well as age. Analysis of adult fingerprint oils has detected traces of estrogen, cholesterol, and nicotine. This suggests that fingerprints could eventually be used to detect the presence of alcohol, drugs, and even certain diseases.—Hank Schlesinger

